

BEST AVAILABLE COPY

PATENT USSN: 10/716,415

Atty Dkt: 034044.028

REMARKS

The Office action mailed 16 August 2005, has been received and its contents carefully noted. The pending claims, claims 1-29, were rejected. By this amendment, claims 1, 3, 11, 18, and 23 have been amended. Support may be found in the specification and the claims as originally filed. No statutory new matter has been added. Therefore, reconsideration and entry of the claims as amended are respectfully requested.

Defective Oath/Declaration

Applicants submit herewith a new declaration in compliance with 37 C.F.R. 1.67(a).

Claim Objections

The Examiner objected to claims 1 and 3 for informalities.

Applicants respectfully submit that the claims as amended obviate the informalities. Therefore, the claim objections should be withdrawn.

Rejection under 35 U.S.C. 112, second paragraph

The Examiner rejected the claims under 35 U.S.C. 112, second paragraph, as being indefinite. Specifically, the Examiner deemed that claim 11 lacked antecedent basis for "the second organic layer".

Applicants respectfully assert that the claims, as amended, are clear and definite and the rejection under 35 U.S.C. 112, second paragraph, should properly be withdrawn.

Rejection under 35 U.S.C. 102(e)

The Examiner rejected claims 1-3, 5-10, 12, 16, 17-21, and 23-26 under 35 U.S.C. 102(e) as being anticipated by Jain et al. (US Patent No. 6,797,412). Specifically, the Examiner deemed that Jain discloses a multilayer polymer-quantum dot light emitting diode comprising at least one quantum dot layer between a first polymer/organic layer and a second polymer layer.

Applicants respectfully submit that the claims as amended are directed to a multilayer polymer-quantum dot light emitting diode comprising at least one *aqueous soluble* quantum dot layer between a first polymer layer and a *spun coat* second polymer layer or a *first polymer layer*

PATENT USSN: 10/716,415

Atty Dkt: 034044.028

and a *spun coat* organic molecule layer. These limitations are important. Although Jain a multilayer polymer-quantum dot light emitting diode, it is clear that Jain does not disclose that the layer on the quantum dot layer is a *spun coat layer*. Jain only discloses quantum dots that are soluble in organic solvents. As noted by the Examiner, Jain fails to teach or suggest that the quantum dots are *hydrophilic*. Thus, Jain does not disclose *aqueous soluble* quantum dot layers. Depositing a polymer layer or an organic molecule layer on top of the quantum dot layer of Jain by spin coating is impossible as the quantum dot layer would dissolve by the organic solvents during the process. Thus, Jain does not disclose a *spun coat* polymer layer or organic molecule layer deposited on an *aqueous soluble* quantum dot layer.

Since Jain does not disclose (1) an *aqueous soluble* quantum dot layer having (2) a *spun coat* polymer layer or organic molecule layer deposited thereon, Jain does not anticipate the claimed invention. Therefore, the rejection under 35 U.S.C. 102(e) should properly be withdrawn.

The Examiner also rejected claims 1-3, 5, 6, 12, 13, 16, 17, and 23-26 under 35 U.S.C. 102(e) as being anticipated by Miller et al. (U.S. Patent No. 6,803,719). Specifically, the Examiner deemed that Miller discloses a multilayer polymer quantum dot light emitting diode comprising at least one quantum dot layer between a first polymer layer and a second polymer layer.

Applicants respectfully submit that like Jain, Miller does not disclose a *spun coat* polymer layer or organic molecule layer deposited on an *aqueous soluble* quantum dot layer. Specifically, the quantum dots in Miller are embedded in an insulating polymer matrix. The Examiner also noted, that Miller does not teach or suggest *hydrophilic* quantum dots. Thus, the quantum dot layer of Miller is not an *aqueous soluble* quantum dot layer. Since Miller does not disclose (1) an *aqueous soluble* quantum dot layer having (2) a *spun coat* polymer layer or organic molecule layer deposited thereon, Miller does not anticipate the claimed invention. Therefore, the rejection under 35 U.S.C. 102(e) should properly be withdrawn.

It should also be noted that the invention of Miller is unrelated to the present invention. Specifically, the application and function of the Miller invention is different from that of the

PATENT USSN: 10/716,415

Atty Dkt: 034044.028

present invention. Since the quantum dots of Miller are embedded in an insulating polymer matrix, the quantum dots only emit light when excited by an external light source, such as another LED. In the present invention, the quantum dots are sandwiched between layers of conductive polymers or organic molecules and emit light when a voltage is applied.

Rejection under 35 U.S.C. 103(a)

The Examiner rejected claims 4 and 15 under 35 U.S.C. 103(a) as being unpatentable over Jain or Miller and further in view of Coombs et al. (U.S. Patent No. 6,572,784). Specifically, the Examiner deemed that it would have been obvious to use the hydrophilic dots of Coombs in Jain or Miller in order to flexible manufacturing times.

Applicants respectfully submit that Coombs is not a proper prior art reference against the present invention. Specifically, Coombs relates to a nonanalogous art. In particular, Coombs has nothing to do with LEDs and applications thereof. Instead, Coombs relates to pigments and foils with applications relating to cosmetics, inks, paints, and the like. Therefore, it is improper to use Coombs as a prior art reference against the present invention. See MPEP 2141.01(a). Since Coombs does not relate to an art analogous to that of the present invention, one of ordinary skill in the art would not be motivated to combine Coombs with Jain or Miller.

Even if the disclosure of Coombs was combined with that of Jain or Miller, the combination does not result in the claimed invention. Specifically, the combination does not result in a multilayer light emitting diode comprising (1) an *aqueous soluble* quantum dot layer having (2) a *spun coat* polymer layer or organic molecule layer deposited thereon.

Therefore, the claim invention is nonobvious and the rejection under 35 U.S.C. 103(a) should properly be withdrawn.

The Examiner rejected various dependent claims under 35 U.S.C. 103(a) as being unpatentable over Jain or Miller in view of Matsuo et al. (U.S. Patent No. 6,391,482), Bawendi et al. (U.S. Patent No. 6,444,143), or Dumbrow et al. (U.S. Patent No. 6,475,364).

As explained above, the claimed invention is directed to a multilayer polymer-quantum dot light emitting diode comprising at least one *aqueous soluble* quantum dot layer between a first polymer layer and a *spun coat* second polymer layer or a *first polymer layer and a spun coat*

PATENT USSN: 10/716,415

Atty Dkt: 034044.028

organic molecule layer. The various combinations of the prior art cited by the Examiner do not alleviate the deficiencies of Jain or Miller. None of the combinations discloses or suggests an *aqueous soluble* quantum dot layer having a *spun coat* polymer layer or organic molecule layer deposited thereon.

Therefore, the present invention as claimed is nonobvious and the rejection under 35 U.S.C. 103(a) should properly be withdrawn.

Request for Interview

Applicants respectfully request either a telephonic or an in-person interview should there be any remaining issues.

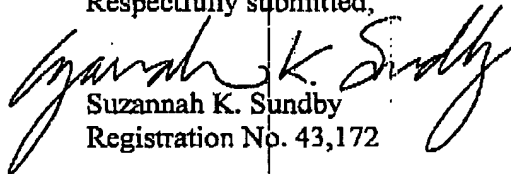
PATENT USSN: 10/716,415
Atty Dkt: 034044.028

CONCLUSION

All of the stated grounds of objection and rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently outstanding objections and rejections and that they be withdrawn. It is believed that a full and complete response has been made to the outstanding Office Action and, as such, the present application is in condition for allowance. If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided.

It is not believed that extensions of time are required, beyond those that may otherwise be provided for in accompanying documents. However, in the event that additional extensions of time are necessary to prevent abandonment of this application, then such extensions of time are hereby petitioned under 37 C.F.R. §1.136(a), and any fees required therefor are hereby authorized to be charged to **Deposit Account No. 02-4300, Attorney Docket No. 034044.028.**

Respectfully submitted,


Suzannah K. Sundby
Registration No. 43,172

Date: 15 November 2005
SMITH, GAMBRELL & RUSSELL, LLP
1850 M Street, N.W., Suite 800
Washington, D.C. 20036
Telephone: (202) 263-4332
Fax: (202) 263-4352
ssundby@sgrlaw.com

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☒ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.